

MLLNVLRICI	IVCLVNDGAG	KHSEGRERTK	TYSLNSRGYF	40
RKERGARRSK	ILLVNTKGLD	EPHIGHGDFG	LVAELFDSTR	80
THTNRKEPDM	NKVKLFSTVA	HG <u>NK</u> SARRKA	Y <u>NG</u> SRRNIFS	120
RRSFDKRNTE	VTEKPGAKMF	WNNFLVKMNG	APQNT <u>SH</u> GSK	160
AQEIMKEACK	TLPFTQNIVH	ENCDRMVIQN	NLCFGKCISL	200
HVPNQQDRRN	TCSHCLPSKF	TLNHLTL <u>NCT</u>	GSKNVVKVVM	240
MVEECTCEAH	KSNFHQTAQF	NMDTSTTLHH		270

Figure 1. Deduced amino acid sequence of *Xenopus cerberus* protein. SEQ ID NO:1.

Figure 2. Nucleotide sequence of the full-length cerberus DNA derived from the *Xenopus* organizer. The sense strand is on top (in the 5' to 3' direction) and the antisense strand on the bottom line (on the opposite direction). SEQ ID NO:2.

GAATTCCTAG CAAGTCGCTC AGAAACACTG CAGGGTCTAG ATATCATACA ATGTTACTAA	60
CTTAAGGGTC GTTCAGCGAG TCTTTGTGAC GTCCAGATC TATAGTATGT TACAATGATT	
ATGTACTCAG GATCTGTATT ATCGTCTGCC TTGTGAATGA TGGAGCAGGA AAACACTCAG	120
TACATGAGTC CTAGACATAA TAGCAGACGG AACACTTACT ACCTCGTCCT TTTGTGAGTC	
AAGGACGAGA AAGGACAAAA ACATATTCAC TTAACAGCAG AGGTTACTTC AGAAAAGAAA	180
TTCTTGCTCT TTCCTGTTTT TGTATAAGTG AATTGTCGTC TCCAATGAAG TCTTTTCTTT	
GAGGAGCAGC TAGGAGCAAG ATTCTGCTGG TGAATACTAA AGGTCTTGAT GAACCCACAC	240
CTCCTCGTGC ATCCTCGTTC TAAGACGACC ACTTATGATT TCCAGAACTA CTTGGGGTGT	
TTGGGCATGG TGATTTTCGC TTAGTAGCTG AACTATTTGA TTCCACCAGA ACACATACAA	300
AACCGTACC ACTAAAAGCG AATCATCGAC TTGATAAACT AAGGTGGTCT TGTGTATGTT	
ACAGAAAAGA GCCAGACATG AACAAAGTCA AGCTTTTCTC AACAGTTGCC CATGGAAACA	360
TGCTTTTCTT CGGTCTGTAC TTGTTTCAGT TCGAAAAGAG TTGTCAACGG GTACCTTTGT	
AAAGTGCAAG AAGAAAAGCT TACAATGGTT CTAGAAGGAA TATTTTTCCT CGCCGTTCTT	420
TTTCACGTTT TTCTTTTCGA ATGTTACCAA GATCTTCCTT ATAAAAAGGA GCGGCAAGAA	
TTGATAAAAG AAATACAGAG GTTACTGAAA AGCCTGGTGC CAAGATGTTT TGGAAACAAT	480
AACTATTTTC TTTATGTCCT CAATGACTTT TCGGACCACG GTTCTACAAG ACCTTGTTAA	
TTTTGGTTAA AATGAATGGA GCCCCACAGA ATACAAGCCA TGGCAGTAAA GCACAGGAAA	540
AAAACCAATT TTAATTACCT CGGGGTGTCT TATGTTCTGGT ACCGTCATTT CGTGTCCTTT	
TAATGAAAGA AGCTTGCAAA ACCTTGTTTT TCACTCAGAA TATTGTACAT GAAACTGTG	600
ATTACTTTCT TCGAACGTTT TGGAAACAAA AGTGAGTCTT ATAACATGTA CTTTGTGAC	
ACAGGATGGT GATACAGAAC AATCTGTGCT TTGGTAAATG CATCTCTCTC CATGTTCCAA	660
TGTCCTACCA CTATGTCTTG TTAGACACGA AACCATTAC GTAGAGAGAG GTACAAGGTT	
ATCAGCAAGA TCGACGAAAT ACTTGTTCCC ATTGCTTGCC GTCCAAATTT ACCCTGAACC	720
TAGTCGTTCT AGCTGCTTTA TGAACAAGGG TAACGAACGG CAGGTTTAAA TGGGACTTGG	
ACCTGACGCT GAATTGTACT GGATCTAAGA ATGTAGTAAA GGTTGTCATG ATGGTAGAGG	780
TGGACTGCGA CTTAACATGA CCTAGATTCT TACATCATTT CCAACAGTAC TACCATCTCC	
AATGCACGTG TGAAGCTCAT AAGAGCAACT TCCACCAAAC TGCACAGTTT AACATGGATA	840
TTACGTGCAC ACTTCGAGTA TTCTCGTTGA AGGTGGTTTG ACGTGTCAA TTGTACCTAT	
CATCTACTAC CCTGCACCAT TAAAGGACTG CCATACAGTA TGGAAATGCC CTTTGTGTTG	900
GTAGATGATG GGACGTGGTA ATTTCTGAC GGTATGTCAT ACCTTTACGG GAAACAACC	
AATATTTGTT ACATACTATG CATCTAAAGC ATTATGTTGC CTTCTATTTT ATATAACCAC	960
TTATAACAA TGTATGATAC GTAGATTTTCG TAATACAACG GAAGATAAAG TATATTGGTG	
ATGGAATAAG GATTGTATGA ATTATAATTA ACAAATGGCA TTTTGTGTAA CATGCAAGAT	1020
TACCTTATTC CTAACATACT TAATATTAAT TGTTTACCGT AAAACACATT GTACGTTCTA	

CTCTGTTCCA	TCAGTTGCAA	GATAAAAGGC	AATATTTGTT	TGACTTTTTT	TCTACAAAAT	1080
GAGACAAGGT	AGTCAACGTT	CTATTTTCCG	TTATAAACAA	ACTGAAAAAA	AGATGTTTTA	
GAATACCCAA	ATATATGATA	AGATAATGGG	GTCAAAACTG	TTAAGGGGTA	ATGTAATAAT	1140
CTTATGGGTT	TATATACTAT	TCTATTACCC	CAGTTTGTGAC	AATTCCCCAT	TACATTATTA	
AGGGACTAAG	TTTGCCCAGG	AGCAGTGACC	CATAACAACC	AATCAGCAGG	TATGATTTAC	1200
TCCCTGATTC	AAACGGGTCC	TCGTCACTGG	GTATTGTTGG	TTAGTCGTCC	ATACTAAATG	
TGGTCACCTG	TTTAAAAGCA	AACATCTTAT	TGGTTGCTAT	GGGTTACTGC	TTCTGGGCAA	1260
ACCAGTGGAC	AAATTTTCGT	TTGTAGAATA	ACCAACGATA	CCCAATGACG	AAGACCCGTT	
AATGTGTGCC	TCATAGGGGG	GTTAGTGTGT	TGTGTACTGA	ATAAATTGTA	TTTATTTTCAT	1320
TTACACACGG	AGTATCCCCC	CAATCACACA	ACACATGACT	TATTTAACAT	AAATAAAGTA	
TGTTACAAAA	AAAAAAA					
ACAATGTTTT	TTTTTTTT					

Fig. 2. (Continuation page 2, SEQ ID NO:2).

MSRTRKVDL LLLAIPGLAL LLLPNAYCAS CEPVRIPMCK SMPWNMTKMP NHLHHSTQAN	60
AILAIEQFEG LLTTECSQDL LFFLCAMYAP ICTIDFQHEP IKPCKSV CER ARAGCEPILI	120
KYRHTWPESL ACEELPVYDR GVCISPEAIV TVEQGTDSMP DFSMDSNNGN CGSGREHCKC	180
KPMKATQKTY LKNNYNYVIR AKVKEVKVKC HDATAIVEVK EILKSSLVNI PKDTVTLTYN	240
SGCLCPQLVA NEEYIIMGYE DKERTRLLLV EGS LAEKWRD RLAKKVKRWD QKLRRPRKSK	300
DPVAPIPNKN SNSRQARS	

Figure 3. Deduced amino acid sequence of *Xenopus* frazzled protein. SEQ ID NO:3.

Figure 4. Nucleotide sequence of the full-length frazzled cDNA derived from the *Xenopus* organizer. The sense strand of the DNA on top (5' to 3' direction) and the antisense strand on the bottom line (opposite direction). SEQ ID NO:4.

GAATTCCTT TCACACAGGA CTCCTGGCAG AGGTGAATGG TTAGCCCTAT GGATTTGGTT	60
CTTAAGGGAA AGTGTGTCTT GAGGACCGTC TCCACTTACC AATCGGGATA CCTAAACCAA	
TGTTGATTTT GACACATGAT TGATTGCTTT CAGATAGGAT TGAAGGACTT GGATTTTAT	120
ACAACATAAA CTGTGTACTA ACTAACGAAA GTCTATCCTA ACTTCCTGAA CCTAAAATA	
CTAATTCTGC ACTTTTAAAT TATCTGAGTA ATTGTTTATT TTGTATTGGA TGGGACTAAA	180
GATTAAGACG TGAAAATTTA ATAGACTCAT TAACAAGTAA AACATAACCT ACCCTGATTT	
GATAAACTTA ACTCCTTGCT TTTGACTTGC CCATAAACTA TAAGGTGGGG TGAGTTGTAG	240
CTATTTGAAT TGAGGAACGA AAACGAACG GGTATTTGAT ATTCCACCCC ACTCAACATC	
TTGCTTTTAC ATGTGCCAG ATTTCCCTG TATTCCCTGT ATTCCCTCTA AAGTAAGCCT	300
AACGAAAATG TACACGGGTC TAAAAGGGAC ATAAGGGACA TAAGGGAGAT TTCATTCCGA	
ACACATACAG GTTGGGCAGA ATAACAATGT CTCGAACAAG GAAAGTGGAC TCATTACTGC	360
TGTGTATGTC CAACCCGTCT TATTGTTACA GAGCTTGTTT CTTTCACCTG AGTAATGACG	
TACTGGCCAT ACCTGGACTG GCGCTTCTCT TATTACCCAA TGCTTACTGT GCTTCGTGTG	420
ATGACCGGTA TGGACCTGAC CGCGAAGAGA ATAATGGGTT ACGAATGACA CGAAGCACAC	
AGCCTGTGCG GATCCCCATG TGCAAATCTA TGCCATGGAA CATGACCAAG ATGCCCAACC	480
TCGGACACGC CTAGGGGTAC ACGTTTAGAT ACGGTACCTT GTACTGGTTC TACGGGTG	
ATCTCCACCA CAGCACTCAA GCCAATGCCA TCCTGGCAAT TGAACAGTTT GAAGGTTTGC	540
TAGAGGTGGT GTCGTGAGTT CGGTTACGGT AGGACCGTTA ACTTGTCAAA CTTCCAAACG	
TGACCACTGA ATGTAGCCAG GACCTTTTGT TCTTCTGTG TGCCATGTAT GCCCCATT	600
ACTGGTGAAT TACATCGGTC CTGGAAAACA AGAAAGACAC ACGGTACATA CGGGGGTAAA	
GTACCATCGA TTTCCAGCAT GAACCAATTA AGCCTTGCAA GTCCGTGTGC GAAAGGGCCA	660
CATGGTAGCT AAAGGTCGTA CTTGGTTAAT TCGGAACGTT CAGGCACACG CTTTCCCGT	
GGGCCGGCTG TGAGCCCATC CTCATAAAGT ACCGGCACAC TTGGCCAGAG AGCCTGGCAT	720
CCCGGCCGAC ACTCGGGTAA GAGTATTTC TGGCCGTGTG AACCAGTCTC TCGGACGTA	
GTGAAGAGCT GCGCGTATAT GACAGAGGAG TCTGCATCTC CCCAGAGGCT ATCGTCACAG	780
CACTTCTCGA CGGGCATATA CTGTCTCTC AGACGTAGAG GGGTCTCCGA TAGCAGTGTC	
TGGAACAAGG AACAGATTCA ATGCCAGACT TCTCCATGGA TTCAAACAAT GGAAATTGCG	840
ACCTTGTTCC TTGTCTAAGT TACGGTCTGA AGAGGTACCT AAGTTTGTTA CCTTTAACGC	
GAAGCGGCAG GGAGCACTGT AAATGCAAGC CCATGAAGGC AACCCAAAAG ACGTATCTCA	900
CTTCGCCGTC CCTCGTGACA TTTACGTTTC GGTACTTCCG TTGGGTTTTT TGCATAGAGT	
AGAATAATTA CAATTATGTA ATCAGAGCAA AAGTGAAAGA GGTGAAAGTG AAATGCCACG	960
TCTTATTAAT GTTAATACAT TAGTCTCGTT TTCACCTTCT CCACTTTCAC TTTACGGTGC	
ACGCAACAGC AATTGTGGAA GTAAAGGAGA TTCTCAAGTC TTCCCTAGTG AACATTCTTA	1020
TGCGTTGTGC TTAACACCTT CATTTCTCTT AAGAGTTCAG AAGGGATCAC TTGTAAGGAT	

AAGACACAGT GACACTGTAC ACCAACTCAG GCTGCTTGTG CCCCAGCTT GTTGCCAATG	1080
TTCTGTGTCA CTGTGACATG TGGTTGAGTC CGACGAACAC GGGGGTCGAA CAACGGTTAC	
AGGAATACAT AATTATGGGC TATGAAGACA AAGAGCGTAC CAGGCTTCTA CTAGTGGAAG	1140
TCCTTATGTA TTAATACCCG ATACTTCTGT TTCTCGCATG GTCCGAAGAT GATCACCTTC	
GATCCTTGGC CGAAAAATGG AGAGATCGTC TTGCTAAGAA AGTCAAGCGC TGGGATCAAA	1200
CTAGGAACCG GCTTTTTTACC TCTCTAGCAG AACGATTCTT TCAGTTCGCG ACCCTAGTTT	
AGCTTCGACG TCCCAGGAAA AGCAAAGACC CCGTGGCTCC AATTCCCAAC AAAACAGCA	1260
TCGAAGCTGC AGGGTCCTTT TCGTTTCTGG GGCACCGAGG TTAAGGGTTG TTTTGTCTGT	
ATTCCAGACA AGCGCGTAGT TAGACTAACG GAAAGGTGTA TGGAACTCT ATGGACTTTG	1320
TAAGGTCTGT TCGCGCATCA ATCTGATTGC CTTTCCACAT ACCTTTGAGA TACCTGAAAC	
AAACTAAGAT TTGCATTGTT GGAAGAGCAA AAAAGAAATT GCACTACAGC ACGTTATATT	1380
TTTGATTCTA AACGTAACAA CCTTCTCGTT TTTTCTTTAA CGTGATGTCG TGCAATATAA	
CTATTGTTTA CTACAAGAAG CTGGTTTAGT TGATTGTAGT TCTCCTTTCC TTCTTTTTTT	1440
GATAACAAAT GATGTTCTTC GACCAATCA ACTAACATCA AGAGGAAAGG AAGAAAAAAA	
TTATAACTAT ATTTGCACGT GTTCCCAGGC AATTGTTTTA TTCAACTTCC AGTGACAGAG	1500
AATATTGATA TAAACGTGCA CAAGGGTCCG TTAACAAAAT AAGTTGAAGG TCACTGTCTC	
CAGTGACTION ATGTCTCAGC CTAAAGAAGC TCAATTCATT TCTGATCAAC TAATGGTGAC	1560
GTCAGTACT TACAGAGTCG GATTTCTTCG AGTTAAGTAA AGACTAGTTG ATTACCACTG	
AAGTGTGTTGA TACTTGGGGA AAGTGAACCT ATTGCAATGG TAAATCAGAG AAAAGTTGAC	1620
TTCAACAACT ATGAACCCCT TTCACCTGAT TAACGTTACC ATTTAGTCTC TTTTCAACTG	
CAATGTTGCT TTTCCTGTAG ATGAACAAGT GAGAGATCAC ATTTAAATGA TGATCACTTT	1680
GTTACAACGA AAAGGACATC TACTTGTTCA CTCTCTAGTG TAAATTTACT ACTAGTGAAA	
CCATTTAATA CTTTCAGCAG TTTTAGTTAG ATGACATGTA GGATGCACCT AAATCTAAAT	1740
GGTAAATTAT GAAAGTCGTC AAAATCAATC TACTGTACAT CCTACGTGGA TTTAGATTTA	
ATTTTATCAT AAATGAAGAG CTGGTTTAGA CTGTATGGTC ACTGTTGGGA AGGTAAATGC	1800
TAAATAGTA TTTACTTCTC GACCAAATCT GACATACCAG TGACAACCCCT TCCATTACG	
CTACTTTGTC AATTCTGTTT TAAAAATTGC CTAAATAAAT ATTAAGTCCT AAATAAAAAA	1860
GATGAAACAG TTAAGACAAA ATTTTAAACG GATTATTATA TAATTCAGGA TTTATTTTTT	
AAAAAAAAAA AAAAA	
TTTTTTTTTT TTTT	

Fig. 4. (Continuation page 2, SEQ ID NO:4).

MLLLFRAIPM LLLGLMVLQT DCEIAQYYID EEEPPGTVIA VLSQHSIFNT TDIPATNFRL	60
MKQFNNSLIG VRES DGQLSI MERIDREQIC RQSLHCNLAL DVVSFSKGHF KLLNVKVEVR	120
DINDHSPHFP SEIMHVEVSE SSSVGTRIPL EIAIDEDVGS NSIQNFQISN NSHFSIDVLT	180
RADGVKYADL VLMRELDREI QPTYIMELLA MDGGVPSLSG TAVVNIRVLD FNDNSPVFER	240
STIAVDLVED APLGYLLEL HATDDDEGVN GEIVYGFSTL ASQEVRLFK INSRTGSVTL	300
EGQVDFETKQ TYEFVQAQD LGNPPLTATC KVTVHILDVN DNTPAITITP LTTVNAGVAY	360
IPETATKENF IALISTDRA SGSNGQVRCT LYGHEHFKLQ QAYEDSYMIV TTSTLDRENI	420
AAYSLTVVAE DLGFPSLTKK KYITVKVSDE NDNA PVFSKP QYEASILENN APGSYITTVI	480
ARDSDSQNG KVNRYLVDK VMGQSLTTFV SLDADSGVLR AVRSLDYEKL KQLDFEIEAA	540
DNGIPQLSTR VQLNLRIVDQ NDNC PVITNP LLNNGSGEVL LPISAPQNYL VFQLKAEDSD	600
EGHNSQLFYT ILRDP SRLFA INKESGEVFL KKQLNSDHSE DLSIVVAVYD LGRPSLSTNA	660
TVKFILTDSF PSNVEVVILQ PSAEEQHQID MSIIFIAVLA GGCALLLLAI FFFVACTCKKK	720
AGEFKQVPEQ HGTCNEERLL STPSPQSVSS SLSQSESCQL SINTESENC SSSNQEQHQQ	780
TGIKHSISVP SYHTSGWHL D NCAMSISGHS HMGHISTKVQ WAKEIVTSMT VTLILVENQK	840
RRALSSQCRH KPVLTQMNO QGSDMPITIS ATESTRVQKM GTHCNMKRA IDCLTL	

**Figure 5.** Deduced amino acid sequence of the *Xenopus* PAPC (paraxial protocadherin) protein. It encodes a member of the cadherin family of transmembrane proteins that has dorsalizing activity when constructs are injected into *Xenopus* embryos. SEQ ID NO:5.

Figure 6. Nucleotide sequence of the full-length PAPC cDNA derived from the *Xenopus* organizer. The sense strand of the DNA is shown in the top line (in the 5' to 3' direction), and the bottom line shows the antisense strand (opposite orientation). SEQ ID NO:6.

GAATTCCCAG AGATGAACTC CTTGAGATTG TTTTAAATGA CTGCAGGTCT GGAAGGATTC	60
CTTAAGGGTC TCTACTTGAG GAACTCTAAC AAAATTTACT GACGTCCAGA CCTTCCTAAG	
ACATTGCCAC ACTGTTTCTA GGCATGAAAA AACTGCAAGT TTCAACTTTG TTTTGGGTGC	120
TGTAACGGTG TGACAAAGAT CCGTACTTTT TTGACGTTCA AAGTTGAAAC AAAAACCACG	
AACTTTGATT CTTCAAGATG CTGCTTCTCT TCAGAGCCAT TCCAATGCTG CTGTTGGGAC	180
TTGAAACTAA GAAGTTCTAC GACGAAGAGA AGTCTCGGTA AGGTTACGAC GACAACCTG	
TGATGGTTTT ACAACAGAC TGTGAAATTG CCCAGTACTA CATAGATGAA GAAGAACCCC	240
ACTACCAAAA TGTTTGCTG ACACTTTAAAC GGGTCATGAT GTATCTACTT CTTCTTGGGG	
CTGGCACTGT AATTGCAGTG TTGTCACAAC ACTCCATATT TAACACTACA GATATACCTG	300
GACCGTGACA TTAACGTCAC AACAGTGTTG TGAGGTATAA ATTGTGATGT CTATATGGAC	
CAACCAATTT CCGTCTAATG AAGCAATTTA ATAATTCCCT TATCGGAGTC CGTGAGAGTG	360
GTTGGTTAAA GGCAGATTAC TTCGTTAAAT TATTAAGGGA ATAGCCTCAG GCACTCTCAC	
ATGGGCAGCT GAGCATCATG GAGAGGATTG ACCGGGAGCA AATCTGCAGG CAGTCCCTTC	420
TACCCGTCGA CTCGTAGTAC CTCCTCTAAC TGGCCCTCGT TTAGACGTCC GTCAGGGAAG	
ACTGCAACCT GGCTTTGGAT GTGGTCAGCT TTTCCAAAGG ACACTTCAAG CTTCTGAACG	480
TGACGTTGGA CCGAAACCTA CACCAGTCGA AAAGGTTTCC TGTGAAGTTC GAAGACTTGC	
TGAAAGTGGA GGTGAGAGAC ATTAATGACC ATAGCCCTCA CTTTCCCAGT GAAATAATGC	540
ACTTTCACCT CCACTCTCTG TAATTACTGG TATCGGGAGT GAAAGGGTCA CTTTATTACG	
ATGTGGAGGT GTCTGAAAGT TCCTCTGTGG GCACCAGGAT TCCTTTAGAA ATTGCAATAG	600
TACACCTCCA CAGACTTTCA AGGAGACACC CGTGGTCCTA AGGAAATCTT TAACGTTATC	
ATGAAGATGT TGGGTCCAAC TCCATCCAGA ACTTTCAGAT CTCAAATAAT AGCCACTTCA	660
TACTTCTACA ACCCAGGTTG AGGTAGGTCT TGAAAGTCTA GAGTTTATTA TCGGTGAAGT	
GCATTGATGT GCTAACCAGA GCAGATGGGG TGAAATATGC AGATTTAGTC TTAATGAGAG	720
CGTAACTACA CGATTGGTCT CGTCTACCCC ACTTTATACG TCTAAATCAG AATTACTCTC	
AACTGGACAG GGAAATCCAG CCAACATACA TAATGGAGCT ACTAGCAATG GATGGGGGTG	780
TTGACCTGTC CCTTTAGGTC GGTGTATGT ATTACCTCGA TGATCGTTAC CTACCCCCAC	
TACCATCACT ATCTGGTACT GCAGTGGTTA ACATCCGAGT CCTGGACTTT AATGATAACA	840
ATGGTAGTGA TAGACCATGA CGTCACCAAT TGTAGGCTCA GGACCTGAAA TTACTATTGT	
GCCCAGTGTT TGAGAGAAGC ACCATTGCTG TGGACCTAGT AGAGGATGCT CCTCTGGGAT	900
CGGGTCACAA ACTCTCTTCG TGGTAACGAC ACCTGGATCA TCTCCTACGA GGAGACCCTA	
ACCTTTTGTT GGAGTTACAT GCTACTGACG ATGATGAAGG AGTGAATGGA GAAATTGTTT	960
TGAAAAACAA CCTCAATGTA CGATGACTGC TACTACTTCC TCACTTACCT CTTTAACAAA	
ATGGATTGAG CACTTTGGCA TCTCAAGAGG TACGTCAGCT ATTTAAATTT AACTCCAGAA	1020
TACCTAAGTC GTGAAACCGT AGAGTTCTCC ATGCAGTCGA TAAATTTTAA TTGAGGTCTT	



CTGGCAGTGT TACTCTTGAA GGCCAAAGTTG ATTTTGAGAC CAAGCAGACT TACGAATTTG	1080
GACCGTCACA ATGAGAACTT CCGGTTCAAC TAAAACTCTG GTTCGTCTGA ATGCTTAAAC	
AGGTACAAGC CCAAGATTTG GGCCCCAACC CACTGACTGC TACTTGTAAG GTAAGTGTTC	1140
TCCATGTTTCG GGTTCCTAAC CCGGGGTTGG GTGACTGACG ATGAACATTT CATTGACAAG	
ATATACTTGA TGTAATGAT AATACCCAG CCATCACTAT TACCCCTCTG ACTACTGTAA	1200
TATATGAAGT ACATTTACTA TTATGGGGTC GGTAGTGATA ATGGGGAGAC TGATGACATT	
ATGCAGGAGT TGCCTATATT CCAGAAACAG CCACAAAGGA GAACCTTTATA GCTCTGATCA	1260
TACGTCCTCA ACGGATATAA GGTCTTTGTC GGTGTTTCCT CTTGAAATAT CGAGACTAGT	
GCACTACTGA CAGAGCCTCT GGATCTAATG GACAAGTTTC CTGTACTCTT TATGGACATG	1320
CGTGATGACT GTCTCGGAGA CCTAGATTAC CTGTTCAAGC GACATGAGAA ATACCTGTAC	
AGCACTTTAA ACTACAGCAA GCTTATGAGG ACAGTTACAT GATAGTTACC ACCTCTACTT	1380
TCGTGAAATT TGATGTCGTT CGAATACTCC TGTCAATGTA CTATCAATGG TGGAGATGAA	
TAGACAGGGA AAACATAGCA GCGTACTCTT TGACAGTAGT TGCAGAAGAC CTTGGCTTCC	1440
ATCTGTCCCT TTTGTATCGT CGCATGAGAA ACTGTCATCA ACGTCTTCTG GAACCGAAGG	
CCTCATTGAA GACCAAAAAG TACTACACAG TCAAGGTTAG TGATGAGAAT GACAATGCAC	1500
GGAGTAACCT CTGGTTTTTC ATGATGTGTC AGTTCCAATC ACTACTCTTA CTGTTACGTG	
CTGTATTTTC TAAACCCAG TATGAAGCTT CTATTCTGGA AAATAATGCT CCAGGCTCTT	1560
GACATAAAAG ATTTGGGGTC ATACTTCGAA GATAAGACCT TTTATTACGA GGTCCGAGAA	
ATATACTAC AGTGATAGCC AGAGACTCTG ATAGTGATCA AAATGGCAAA GTAAATTACA	1620
TATATTGATG TCACTATCGG TCTCTGAGAC TATCACTAGT TTTACCGTTT CATTTAATGT	
GACTTGTGGA TGCAAAAAGT ATGGGCCAGT CACTAACAAC ATTTGTTTCT CTTGATGCGG	1680
CTGAACACCT ACGTTTTTAC TACCCGGTCA GTGATTGTTG TAAACAAAGA GAACTACGCC	
ACTCTGGAGT ATTGAGAGCT GTTAGGTCTT TAGACTATGA AAAACTTAAA CAACTGGATT	1740
TGAGACCTCA TAACTCTCGA CAATCCAGAA ATCTGATACT TTTTGAATTT GTTGACCTAA	
TTGAAATTGA AGCTGCAGAC AATGGGATCC CTCAACTCTC CACTCGCGTT CAACTAAATC	1800
AACTTTAACT TCGACGCTG TTACCCTAGG GAGTTGAGAG GTGAGCGCAA GTTGATTAG	
TCAGAATAGT TGATCAAAAT GATAATTGCC CTGTGATAAC TAATCCTCTT CTTAATAATG	1860
AGTCTTATCA ACTAGTTTTA CTATTAACGG GACACTATTG ATTAGGAGAA GAATTATTAC	
GCTCGGGTGA AGTTCTGCTT CCCATCAGCG CTCCTCAAAA CTATTTAGTT TTCCAGCTCA	1920
CGAGCCCACT TCAAGACGAA GGGTAGTCGC GAGGAGTTTT GATAAATCAA AAGGTCGAGT	
AAGCGAGGA TTCAGATGAA GGGCACAACT CCCAGCTGTT CTATACCATA CTGAGAGATC	1980
TTCGGCTCCT AAGTCTACTT CCCGTGTTGA GGGTCGACAA GATATGGTAT GACTCTCTAG	
CAAGCAGATT GTTTGCCATT AACAAAGAAA GTGGTGAAGT GTTCCTGAAA AAACAATTAA	2040
GTTCGTCTAA CAAACGGTAA TTGTTTCTTT CACCACTTCA CAAGGACTTT TTTGTTAATT	
ACTCTGACCA TTCAGAGGAC TTGAGCATAG TAGTTGCAGT GTATGACTTG GGAAGACCTT	2100
TGAGACTGGT AAGTCTCCTG AACTCGTATC ATCAACGTCA CATACTGAAC CCTTCTGGAA	
CATTATCCAC CAATGCTACA GTTAAATTCA TCCTCACCAG CTCTTTTCCT TCTAACGTTG	2160
GTAATAGGTG GTTACGATGT CAATTTAAGT AGGAGTGGCT GAGAAAAGGA AGATTGCAAC	

Fig. 6. (Continuation page 2, SEQ ID NO:6).

AAGTCGTTAT TTTGCAACCA TCTGCAGAAG AGCAGCACCA GATCGATATG TCCATTATAT	2220
TTCAGCAATA AAACGTTGGT AGACGCTCTC TCGTCGTGGT CTAGCTATAC AGGTAATATA	
TCATTGCAGT GCTGGCTGGT GGTGTGTGCTT TGCTACTTTT GGCCATCTTT TTTGTGGCCT	2280
AGTAACGTCA CGACCGACCA CCAACACGAA ACGATGAAAA CCGGTAGAAA AAACACCGGA	
GTA CTTGTAA AAAGAAAGCT GGTGAATTTA AGCAGGTACC TGAACAACAC GGAACATGCA	2340
CATGAACATT TTTCTTTTGA CCACTTAAAT TCGTCCATGG ACTTGTTGTG CCTTGTACGT	
ATGAAGAACG CCTGTTAAGC ACCCCATCTC CCCAGTCGGT CTCTTCTTCT TTGTCTCAGT	2400
TACTTCTTGC GGACAATTCTG TGGGGTAGAG GGGTCAGCCA GAGAAGAAGA AACAGAGTCA	
CTGAGTCATG CCAACTCTCC ATCAATACTG AATCTGAGAA TTGCAGCGTG TCCTCTAACC	2460
GACTCAGTAC GGTTGAGAGG TAGTTATGAC TTAGACTCTT AACGTCGCAC AGGAGATTGG	
AAGAGCAGCA TCAGCAAACA GGCATAAAGC ACTCCATCTC TGTACCATCT TATCACACAT	2520
TTCTCGTCGT AGTCGTTTGT CCGTATTTCTG TGAGGTAGAG ACATGGTAGA ATAGTGTGTA	
CTGGTTGGCA CCTGGACAAT TGTGCAATGA GCATAAGTGG ACATTCTCAC ATGGGGCACA	2580
GACCAACCGT GGACCTGTTA ACACGTTACT CGTATTCACC TGTAAGAGTG TACCCCGTGT	
TTAGTACAAA GGTACAGTGG GCAAAGGAGA TAGTGACTTC AATGACAGTG ACTCTGATAC	2640
AATCATGTTT CCATGTCACC CGTTTCCTCT ATCACTGAAG TTACTGTCAC TGAGACTATG	
TAGTGGAGAA TCAGAAAAGA AGAGCATTGA GCAGCCAATG CAGGCACAAG CCAGTGCTCA	2700
ATCACCTCTT AGTCTTTTCT TCTCGTAACT CGTCGGTTAC GTCCGTGTTT GGTACAGAGT	
ATACACAGAT GAATCAGCAG GGTCCGACA TGCCGATAAC TATTTAGCC ACCGAATCAA	2760
TATGTGTCTA CTTAGTCGTC CCAAGGCTGT ACGGCTATTG ATAAAGTCGG TGGCTTAGTT	
CAAGGGTCCA GAAATGGGA ACTGCACATT GCAATATGAA AAGGGCTATA GACTGTCTTA	2820
GTTCCAGGT CTTTACCCT TGACGTGTA CGTTATACTT TTCCCGATAT CTGACAGAAT	
CTCTGTAGCT CCTGTATATT ACAATACCTA CCATGCAAGA ATGCCTAACC TGCACATACC	2880
GAGACATCGA GGACATATAA TGTTATGGAT GGTACGTTCT TACGGATTGG ACGTGTATGG	
GAACCATACC CTTAGAGACC CTTATTACCA TATCAATAAT CCTGTTGCTA ATCGGATGCA	2940
CTTGGTATGG GAATCTCTGG GAATAATGGT ATAGTTATTA GGACAACGAT TAGCCTACGT	
GGCGGAATAT GAAAGAGATT TAGTCAACAG AAGTGCAACG TTATCTCCGC AGAGATCGTC	3000
CCGCCTTATA CTTTCTCTAA ATCAGTTGTC TTCACGTTGC AATAGAGGCG TCTCTAGCAG	
TAGCAGATAC CAAGAATTCA ATTACAGTCC GCAGATATCA AGACAGCTTC ATCCTTCAGA	3060
ATCGTCTATG GTTCTTAAGT TAATGTCAGG CGTCTATAGT TCTGTGGAAG TAGGAAGTCT	
AATTGCTACA ACCTTTTAAAT CATTAGGCAT GCAAGTGAGA ATGCACAAAG GCAAGTGCTT	3120
TTAACGATGT TGGAAAATTA GTAATCCGTA CGTTCACTCT TACGTGTTT CGTTCACGAA	
TAGCATGAAA GCTAAATATA TGGAGTCTCC CCTTTCCCTC TGATGGATGG GGGGAGACAC	3180
ATCGTACTTT CGATTTATAT ACCTCAGAGG GGAAAGGGAG ACTACCTACC CCCCTCTGTG	
AGGACAGTGC ATAAATATAC AGCTGCTTTC TATTTGCATT TCACTGGGA ATTTTTGTG	3240
TCCTGTCACG TATTTATATG TCGACGAAAG ATAAACGTAA AGTGAACCCT TAAAAACAA	
TTTTTTACAT ATTTATTTTT CCTGAATTGA ATGTGACATT GTCCTGTCAC CTAAGTAGCA	3300
AAAAAATGTA TAAATAAAAA GGAAGTAACT TAACTGTAA CAGGACAGTG GATTGATCGT	

Fig. 6. (Continuation page 3, SEQ ID NO:6).

ATTAAATCCA	CAGACCTACA	GTCAAATATT	TGAGGGCCCC	TGAAACAGCA	CATCAGTCAG	3360
TAATTTAGGT	GTCTGGATGT	CAGTTTATAA	ACTCCCGGGG	ACTTTGTCGT	GTAGTCAGTC	
GACCTAAAGT	GGCCTTTTTA	CTTTTAGCAG	CTCCTGGGTC	TGCCCTCTGT	GTTAATCAGC	3420
CTGGATTTCA	CCGGA AAAAT	GAAATCGTC	GAGGACCCAG	ACGGGAGACA	CAATTAGTCG	
CCCTGGTCAA	GTCCTGAGTA	GGATCATGGC	GTTTTTATAT	GCATCTCACC	TACTTTGGAC	3480
GGGACCA GTT	CAGGACTCAT	CCTAGTACCG	CAAAAATATA	CGTAGAGTGG	ATGAAACCTG	
GTGATTTACA	CATAATAGGA	AACGCTTGGT	TTCAGTGAAG	TCTGTGTTGT	ATATATTCTG	3540
CACTAAATGT	GTATTATCCT	TTGCGAACCA	AAGTCACTTC	AGACACAACA	TATATAAGAC	
TTATATACAC	GCATTTTGTG	TTTGTGTATA	TATTTCAAGT	CCATTCAGAT	ATGTGTATAT	3600
AATATATGTG	CGTAA AACAC	AAACACATAT	ATAAAGTTCA	GGTAAGTCTA	TACACATATA	
AGTGCAGACC	TTGTAAATTA	AATATTCTGA	TACTTTTCC	TCAATAAATA	TTTAAAT	
TCACGTCTGG	AACATTTAAT	TTATAAGACT	ATGAAAAAGG	AGTTATTAT	AAATTTA	

Fig. 6. (Continuation page 4, SEQ ID NO:6).

MVCCGPGRML LGWAGLLVLA ALCLLQVPGA QAAACEPVRI PLCKSLPWNM TKMPNHLHHS 60  
TQANAILAME QFEGLLGTHC SPDLLFFLCA MYAPICTIDF QHEPIKPKCS VCERARQGCE 120  
PILIKYRHSW PESLACDELP VYDRGVCISP EAIVTADGAD FPMDSSTGHC RGASSERCKC 180  
KPVRATQKTY FRNNYNYVIR AKVKEVKMKC HDVTAVVEVK EILKASLVNI PRDTVNLYTT 240  
SGCLCPPLTV NEEYVIMGYE DEERSRLLLV EGSIAEKWKD RLGKKVKRWD MKLRHLGLGK 300  
TDASDSTQNQ KSGRNSNPRP ARS.

Figure 7. Deduced amino acid sequence of mouse FRZB-1 protein. SEQ ID NO:7.

Figure 8. Nucleotide sequence of the full-length mouse FRZB-1 cDNA. SEQ ID NO:8.

AAGCCTGGGA CCATGGTCTG CTGCGGCCCG GGACGGATGC TGCTAGGATG GGCCGGGTTG	60
TTCGGACCCT GGTACCAGAC GACGCCGGGC CCTGCCTACG ACGATCCTAC CCGGCCCAAC	
CTAGTCCTGG CTGCTCTCTG CCTGCTCCAG GTGCCCCGAG CTCAGGCTGC AGCCTGTGAG	120
GATCAGGACC GACGAGAGAC GGACGAGGTC CACGGGCCTC GAGTCCGACG TCGGACACTC	
CCTGTCCGCA TCCCGCTGTG CAAGTCCCTT CCCTGGAACA TGACCAAGAT GCCCAACCAC	180
GGACAGGCGT AGGGCGACAC GTTCAGGGAA GGGACCTTGT ACTGGTTCTA CGGGTTGGTG	
CTGCACCACA GCACCCAGGC TAACGCCATC CTGGCCATGG AACAGTTCGA AGGGCTGCTG	240
GACGTGGTGT CGTGGGTCCG ATTGCGGTAG GACCGGTACC TTGTCAAGCT TCCCACGAC	
GGCACCCTACT GCAGCCCGGA TCTTCTCTTC TTCCTCTGTG CAATGTACGC ACCCATTTGC	300
CCGTGGGTGA CGTCGGGCCT AGAAGAGAAG AAGGAGACAC GTTACATGCG TGGGTAAACG	
ACCATCGACT TCCAGCACGA GCCCATCAAG CCCTGCAAGT CTGTGTGTGA GCGCGCCCGA	360
TGGTAGCTGA AGGTCGTGCT CGGGTAGTTC GGGACGTTCA GACACACACT CGCGCGGGCT	
CAGGGCTGCG AGCCCATTTCT CATCAAGTAC CGCCACTCGT GGCCGGAAAAG CTTGGCCTGC	420
GTCCCAGCGC TCGGGTAAGA GTAGTTCATG GCGGTGAGCA CCGGCCTTTC GAACCGGACG	
GACGAGCTGC CGGTGTACGA CCGCGGCGTG TGCATCTCTC CTGAGGCCAT CGTCACCGCG	480
CTGCTCGACG GCCACATGCT GGCGCCGCAC ACGTAGAGAG GACTCCGGTA GCAGTGGCGC	
GACGGAGCGG ATTTTCCTAT GGATTCAAGT ACTGGACACT GCAGAGGGGC AAGCAGCGAA	540
CTGCCTCGCC TAAAAGGATA CCTAAGTTCA TGACCTGTGA CGTCTCCCCG TTCGTCGCTT	
CGTTGCAAAT GTAAGCCTGT CAGAGCTACA CAGAAGACCT ATTTCCGGAA CAATTACAAC	600
GCAACGTTTA CATTCGGACA GTCTCGATGT GTCTTCTGGA TAAAGGCCTT GTTAATGTTG	
TATGTCATCC GGGCTAAAGT TAAAGAGGTA AAGATGAAAT GTCATGATGT GACCGCCGTT	660
ATACAGTAGG CCCGATTTCA ATTTCTCCAT TTCTACTTTA CAGTACTACA CTGGCGGCAA	
GTGGAAGTGA AGGAAATTCT AAAGGCATCA CTGGTAAACA TTCCAAGGGA CACCGTCAAT	720
CACCTTCACT TCCTTTAAGA TTTCCGTAGT GACCATTGTG AAGGTTCCCT GTGGCAGTTA	
CTTTATACCA CCTCTGGCTG CCTCTGTCCT CCACTTACTG TCAATGAGGA ATATGTCATC	780
GAAATATGGT GGAGACCGAC GGAGACAGGA GGTGAATGAC AGTTACTCCT TATACAGTAG	
ATGGGCTATG AAGACGAGGA ACGTTCCAGG TTA CTCTTGG TAGAAGGCTC TATAGCTGAG	840
TACCCGATAC TTCTGCTCCT TGCAAGGTCC AATGAGAACC ATCTTCCGAG ATATCGACTC	
AAGTGGAAGG ATCGGCTTGG TAAGAAAGTC AAGCGCTGGG ATATGAAACT CCGACACCTT	900
TTACCTTCC TAGCCGAACC ATTCTTTCAG TTCGCGACCC TATACTTTGA GGCTGTGGAA	
GGACTGGGTA AACTGATGC TAGCGATTCC ACTCAGAATC AGAAGTCTGG CAGGAACCTC	960
CCTGACCCAT TTTGACTACG ATCGCTAAGG TGAGTCTTAG TCTTCAGACC GTCCTTGAGA	

AATCCCCGGC CAGCACGCAG CTAAATCCTG AAATGTAAAA GGCCACACCC ACGGACTCCC 1020  
TTAGGGGGCCG GTCGTGCGTC GATTTAGGAC TTTACATTTT CCGGTGTGGG TGCCTGAGGG  
  
TTCTAAGACT GGCGCTGGTG GACTAACAAA GGAAAACCGC ACAGTTGTGC TCGTGACCGA 1080  
AAGATTCTGA CCGCGACCAC CTGATTGTTT CCTTTTGGCG TGTCAACACG AGCACTGGCT  
  
TTGTTTACCG CAGACACCGC GTGGCTACCG AAGTTACTTC CGGTCCCCTT TCTCCTGCTT 1140  
AACAAATGGC GTCTGTGGCG CACCGATGGC TTCAATGAAG GCCAGGGGAA AGAGGACGAA  
  
CTTAATGGCG TGGGGTTAGA TCCTTTAATA TGTATATAT TCTGTTTCAT CAATCACGTG 1200  
GAATTACCGC ACCCCAATCT AGGAAATTAT ACAATATATA AGACAAAGTA GTTAGTGCAC  
  
GGGACTGTTT TTTTGCAACC AGAATAGTAA ATTAATATG TTGATGCTAA GGTTCCTGTA 1260  
CCCTGACAAG AAAACGTTGG TCTTATCATT TAATTTATAC AACTACGATT CCAAAGACAT  
  
CTGGACTCCC TGGGTTTAAT TTGGTGTCT GTACCCTGAT TGAGAATGCA ATGTTTCATG 1320  
GACCTGAGGG ACCCAAATTA AACCACAAGA CATGGGACTA ACTCTTACGT TACAAAGTAC  
  
TAAAGAGAGA ATCCTGGTCA TATCTCAAGA ACTAGATATT GCTGTAAGAC AGCCTCTGCT 1380  
ATTTCTCTCT TAGGACCACT ATAGAGTTCT TGATCTATAA CGACATTCTG TCGGAGACGA  
  
GCTGCGCTTA TAGTCTTGTC TTTGTATGCC TTTGTCCATT TCCCTCATGC TGTGAAAGTT 1440  
CGACGCGAAT ATCAGAACAC AAACATACGG AAACAGGTAA AGGGAGTACG ACACTTTCAA  
  
ATACATGTTT ATAAAGGTAG AACGGCATT TGAATCAGA CACTGCACAA GCAGAGTAGC 1500  
TATGTACAAA TATTTCCATC TTGCCGTAAA ACTTTAGTCT GTGACGTGTT CGTCTCATCG  
  
CCAACACCAG GAAGCATTTA TGAGGAAACG CCACACAGCA TGAATTATTT TCAAGATTGG 1560  
GGTTGTGGTC CTTTCGTAAAT ACTCCTTTGC GGTGTGTCGT ACTGAATAAA AGTTCTAACC  
  
CAGGCAGCAA AATAAATAGT GTTGGGAGCC AAGAAAAGAA TATTTTGCCT GGTAAAGGGG 1620  
GTCCGTCGTT TTATTTATCA CAACCCTCGG TTCTTTTCTT ATAAACGGA CCAATTCCCC  
  
CACACTGGAA TCAGTAGCCC TTGAGCCATT AACAGCAGTG TTCTTCTGGC AAGTTTTTGA 1680  
GTGTGACCTT AGTCATCGGG AACTCGGTAA TTGTCGTCAC AAGAAGACCG TTCAAAACT  
  
TTTGTTTATA AATGTATTCA CGAGCATTAG AGATGAACCT ATAAC TAGAC ATCTGTTGTT 1740  
AAACAAGTAT TTACATAAGT GCTCGTAATC TCTACTTGAA TATTGATCTG TAGACAACAA  
  
ATCTCTATAG CTCTGCTTCC TTCTAAATCA AACCATTGTT TGGATGCTCC CTCTCCATTC 1800  
TAGAGATATC GAGACGAAGG AAGATTTAGT TTGGGTAACA ACCTACGAGG GAGAGGTAAG

ATAAATAAAT	TTGGCTTGCT	GTATTGGCCA	GGAAAAGAAA	GTATTAAAGT	ATGCATGCAT	1860
TATTTATTTA	AACCGAACGA	CATAACCGGT	CCTTTTCCTT	CATAATTTCA	TACGTACGTA	
GTGCACCAGG	GTGTTATTTA	ACAGAGGTAT	GTAAGCTCTAT	AAAAGACTAT	AATTTACAGG	1920
CACGTGGTCC	CACAATAAAT	TGTCTCCATA	CATTGAGATA	TTTTCTGATA	TTAAATGTCC	
ACACGGAAAT	GTGCACATTT	GTTTACTTTT	TTTCTTCCTT	TTGCTTTGGG	CTTGTGATTT	1980
TGTGCCTTTA	CACGTGTAAA	CAAATGAAAA	AAAGAAGGAA	AACGAAACCC	GAACACTAAA	
TGGTTTTTGG	TGTGTTTATG	TCTGTATTTT	GGGGGGTGGG	TAGGTTTAAG	CCATTGCACA	2040
ACCAAAAACC	ACACAAATAC	AGACATAAAA	CCCCCACC	ATCCAAATTC	GGTAACGTGT	
TTCAAGTTGA	ACTAGATTAG	AGTAGACTAG	GCTCATTGGC	CTAGACATTA	TGATTTGAAT	2100
AAGTTCAACT	TGATCTAATC	TCATCTGATC	CGAGTAACCG	GATCTGTAAT	ACTAACTTA	
TTGTGTTGTT	TAATGCTCCA	TCAAGATGTC	TAATAAAAGG	AATATGGTTG	TCAACAGAGA	2160
AACACAACAA	ATTACGAGGT	AGTTCTACAG	ATTATTTTCC	TTATACCAAC	AGTTGTCTCT	
CGACAACAAC	AACAAA					
GCTGTTGTTG	TTGTTT					

MVCGSPGGML LLRAGLLALA ALCLLRVPGA RAAACEPVRI PLCKSLPWNM TKMPNHLHHS	60
TQANAILAIE QFEGLLGTHC SPDLLFFLCA MYAPICTIDF QHEPIKPCKS VCERARQGCE	120
PILIKYRHSW PENLACEELP VYDRGVCISP EAIVTADGAD FPMDSNGNC RGASSERCKC	180
KPIRATQKTY FRNNYNYVIR AKVKEIKTKC HDVTAVVEVK EILKSSLVNI PRDTVNLITS	240
SGCLCPPLNV NEEYIIMGYE DEERSRLLLV EGSIAEKWKD RLGKKVKRWD MKLRHLGLSK	300
SDSSNSDSTQ SQKSGRNSNP RQARN.	

**Figure 9.** Deduced amino acid sequence of human FRZB-1 protein. SEQ ID NO:9.



**Figure 10.** Nucleotide sequence of the full-length human FRZB-1 cDNA. SEQ ID NO:10.  
This sequence was assembled from public ESTs from the Genbank database  
(accession numbers: H18848, R63748, W38677, W44760, H38379 and N71244).

GGCGGAGCGG GCCTTTTGGC GTCCACTGCG CGGCTGCACC CTGCCCCATC TGCCGGGATC	60
CCGCCTCGCC CGGAAAACCG CAGGTGACGC GCCGACGTGG GACGGGGTAG ACGGCCCTAG	
ATGGTCTGCG GCAGCCCAGG AGGGATGCTG CTGCTGCGGG CCGGGCTGCT TGCCCTGGCT	120
TACCAGACGC CGTCGGGCCC TCCCTACGAC GACGACGCCC GGCCCGACGA ACGGGACCGA	
GCTCTCTGCC TGCTCCGGGT GCCCGGGGCT CGGGCTGCAG CCTGTGAGCC CGTCCGCATC	180
CGAGAGACGG ACGAGGCCCA CGGGCCCCGA GCCCGACGTC GGACACTCGG GCAGGCGTAG	
CCCCGTGTGCA AGTCCCTGCC CTGGAACATG ACTAAGATGC CCAACCACCT GCACCACAGC	240
GGGGACACGT TCAGGGACGG GACCTTGTAC TGATTCTACG GGTGTTGGTA CGTGGTGTCTG	
ACTCAGGCCA ACGCCATCCT GGCCATCGAG CAGTTCGAAG GTCTGCTGGG CACCCACTGC	300
TGAGTCCGGT TGCGGTAGGA CCGGTAGCTC GTCAAGCTTC CAGACGACCC GTGGGTGACG	
AGCCCCGATC TGCTCTTCTT CCTCTGTGCC ATGTACGCGC CCATCTGCAC CATTGACTTC	360
TCGGGGCTAG ACGAGAAGAA GGAGACACGG TACATGCGCG GGTAGACGTG GTAAGTGAAG	
CAGCACGAGC CCATCAAGCC CTGTAAGTCT GTGTGCGAGC GGGCCCGCA GGGCTGTGAG	420
GTCGTGCTCG GGTAGTTCGG GACATTCAGA CACACGCTCG CCCGGGCCGT CCCGACACTC	
CCCATACTCA TCAAGTACCG CCACTCGTGG CCGGAGAACC TGGCCTGCGA GGAGCTGCCA	480
GGGTATGAGT AGTTCATGGC GGTGAGCACC GGCTCTTGG ACCGGACGCT CCTCGACGGT	
GTGTACGACA GGGGCGTGTG CATCTCTCCC GAGGCCATCG TTAAGTGCAG CAGGAGCTGAT	540
CACATGCTGT CCGCGCACAC GTAGAGAGGG CTCCGGTAGC AATGACGCCT GCCTCGACTA	
TTTCCTATGG ATTCTAGTAA CGGAACTGT AGAGGGGCAA GCAGTGAACG CTGTAAATGT	600
AAAGGATACC TAAGATCATT GCCTTTGACA TCTCCCCGTT CGTCACTTGC GACATTTACA	
AAGCCTATTA GAGCTACACA GAAGACCTAT TTCCGGAACA ATTACAATA TGTCATTCCG	660
TTCCGATAAT CTCGATGTGT CTTCTGGATA AAGGCCTTGT TAATGTTGAT ACAGTAAGCC	
GCTAAAGTTA AAGAGATAAA GACTAAGTGC CATGATGTGA CTGCAGTAGT GGAGGTGAAG	720
CGATTTCAAT TTCTCTATTT CTGATTCACG GTACTACACT GACGTCATCA CCTCCACTTC	
GAGATTCTAA AGTCCTCTCT GGTAAACATT CCACGGGACA CTGTCAACCT CTATACCAGC	780
CTCTAAGATT TCAGGAGAGA CCATTTGTAA GGTGCCCTGT GACAGTTGGA GATATGGTCC	
TCTGGCTGCC TCTGCCCTCC ACTTAATGTT AATGAGGAAT ATATCATCAT GGGCTATGAA	840
AGACCGACGG AGACGGGAGG TGAATTACAA TTAAGCTTAA TATAGTAGTA CCCGATACTT	

GATGAGGAAC	GTTCCAGATT	ACTCTTGGTG	GAAGGCTCTA	TAGCTGAGAA	GTGGAAGGAT	900
CTACTCCTTG	CAAGGTCTAA	TGAGAACCAC	CTTCCGAGAT	ATCGACTCTT	CACCTTCCTA	
CGACTCGGTA	AAAAAGTTAA	GCGCTGGGAT	ATGAAGCTTC	GTCATCTTGG	ACTCAGTAAA	960
GCTGAGCCAT	TTTTTCAATT	CGCGACCCTA	TACTTCGAAG	CAGTAGAACC	TGAGTCATTT	
AGTGATTCTA	GCAATAGTGA	TTCCACTCAG	AGTCAGAAGT	CTGGCAGGAA	CTCGAACCCC	1020
TCACTAAGAT	CGTTATCACT	AAGGTGAGTC	TCAGTCTTCA	GACCGTCCTT	GAGCTTGGGG	
CGGCAAGCAC	GCAACTAAAT	CCCGAAATAC	AAAAAGTAAC	ACAGTGGACT	TCCTATTAAAG	1080
GCCGTTTCGTG	CGTTGATTTA	GGGCTTTATG	TTTTTTCATTG	TGTCACCTGA	AGGATAATTC	
ACTTACTTGC	ATTGCTGGAC	TAGCAAAGGA	AAATTGCACT	ATTGCACATC	ATATTCTATT	1140
TGAATGAACG	TAACGACCTG	ATCGTTTCCT	TTTAACGTGA	TAACGTGTAG	TATAAGATAA	
GTTTACTATA	AAAATCATGT	GATAACTGAT	TATTACTTCT	GTTTCTCTTT	TGGTTTCTGC	1200
CAAATGATAT	TTTTAGTACA	CTATTGACTA	ATAATGAAGA	CAAAGAGAAA	ACCAAAGACG	
TTCTCTCTTC	TCTCAACCCC	TTTGTAATGG	TTTGGGGGCA	GACTCTTAAG	TATATTGTGA	1260
AAGAGAGAAG	AGAGTTGGGG	AAACATTACC	AAACCCCCGT	CTGAGAATTC	ATATAACACT	
GTTTTCTATT	TCACTAATCA	TGAGAAAAAC	TGTTCTTTTTG	CAATAATAAT	AAATTAAACA	1320
CAAAGATAA	AGTGATTAGT	ACTCTTTTTG	ACAAGAAAAC	GTTATTATTA	TTTAATTTGT	
TGCTGTTACC	AGAGCCTCTT	TGCTGAGTCT	CCAGATGTTA	ATTTACTTTC	TGCACCCCAA	1380
ACGACAAATGG	TCTCGGAGAA	ACGACTCAGA	GGTCTACAAT	TAAATGAAAG	ACGTGGGGTT	
TTGGGAATGC	AATATTGGAT	GAAAAGAGAG	GTTTCTGGTA	TTACACAGAA	GCTAGATATG	1440
AACCTTTACG	TTATAACCTA	CTTTTCTCTC	CAAAGACCAT	AAGTGTCTTT	CGATCTATAC	
CCTTAAACA	TACTCTGCCG	ATCTAATTAC	AGCCTTATTT	TTGTATGCCT	TTTGGGCATT	1500
GGAATTTTGT	ATGAGACGGC	TAGATTAAATG	TCGGAATAAA	AACATACGGA	AAACCCGTAA	
CTCCTCATGC	TTAGAAAGTT	CCAAATGTTT	ATAAAGGTAA	AATGGCAGTT	TGAAGTCAAA	1560
GAGGAGTACG	AATCTTTCAA	GGTTTACAAA	TATTTCCATT	TTACCGTCAA	ACTTCAGTTT	
TGTCACATAG	GCAAAGCAAT	CAAGCACCAG	GAAGTGTTTA	TGAGGAAACA	ACACCCAAGA	1620
ACAGTGTATC	CGTTTCGTTA	GTTCGTGGTC	CTTCACAAAT	ACTCCTTTGT	TGTGGGTTCT	
TGAATTATTT	TTGAGACTGT	CAGGAAGTAA	AATAAATAGG	AGCTTAAGAA	AGAACATTTT	1680
ACTTAATAAA	AACTCTGACA	GTCCTTCATT	TTATTTATCC	TCGAATTCCT	TCTTGTAATAA	
GCCTGATTGA	GAAGCACAAAC	TGAAACCAGT	AGCCGCTGGG	GTGTTAATGG	TAGCATTTCTT	1740
CGGACTAACT	CTTCGTGTTG	ACTTTGGTCA	TCGGCGACCC	CACAAATACC	ATCGTAAGAA	
CTTTTGGCAA	TACATTTGAT	TTGTTTCATGA	ATATATTAAT	CAGCATTAGA	GAAATGAATT	1800
GAAAACCGTT	ATGTAAACTA	AACAAGTACT	TATATAATTA	GTCGTAATCT	CTTTACTTAA	
ATAACTAGAC	ATCTGCTGTT	ATCACCATAG	TTTTGTTTAA	TTTGCTTCCT	TTTAAATAAA	1860
TATTGATCTG	TAGACGACAA	TAGTGGTATC	AAAACAAATT	AAACGAAGGA	AAATTTATTT	
CCCATTGGTG	AAAGTCAAAA	AAAAAAAAAA	AAA			
GGGTAACCAC	TTTCAGTTTT	TTTTTTTTTT	TTT			